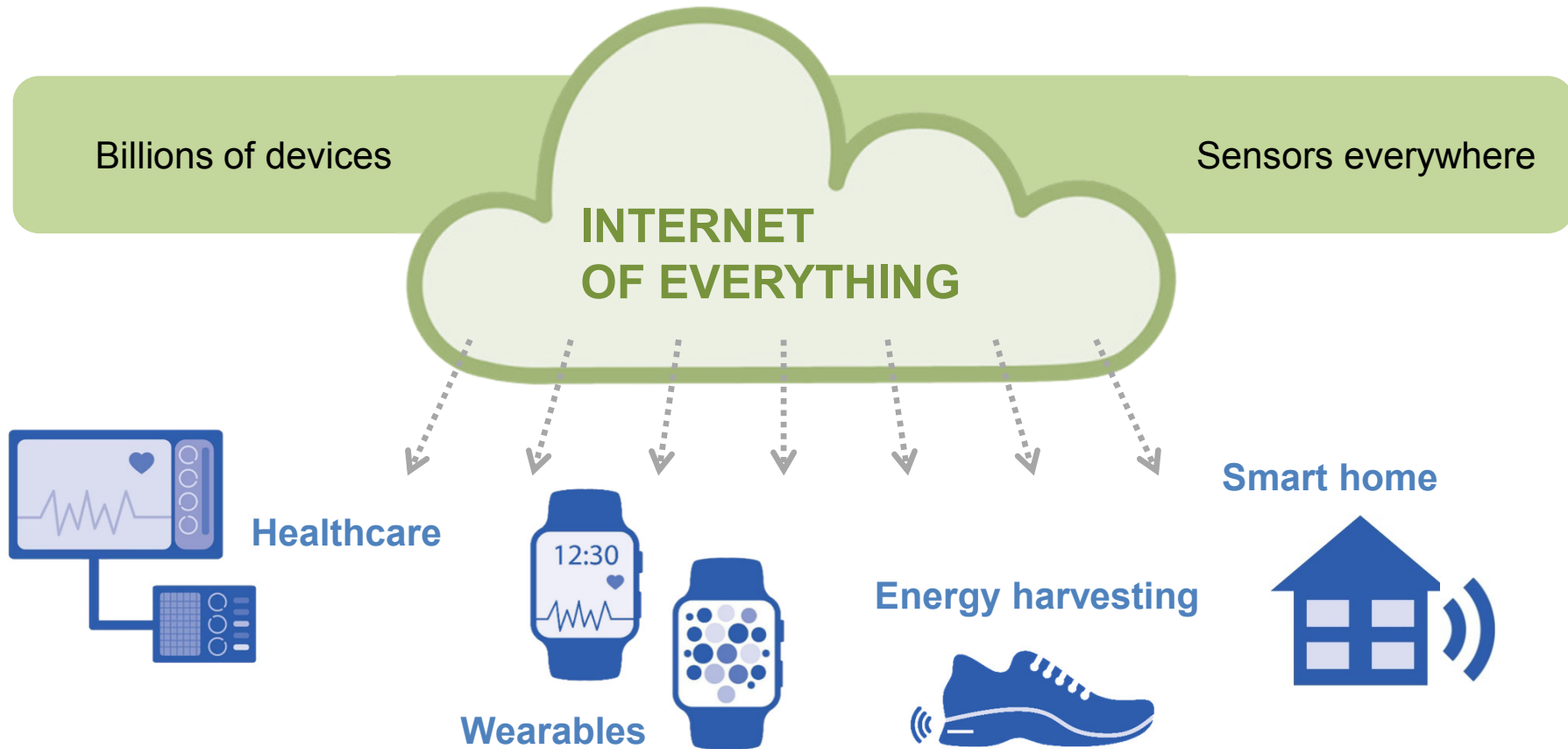


CeraCharge™

World's first rechargeable solid-state SMD battery

Demand for a new battery technology



**New application fields driving demand
for compact, safe, rechargeable energy sources**

Requirements for new battery technology

Miniaturization

Ultra-low power

Rechargeable

SMT-compatible

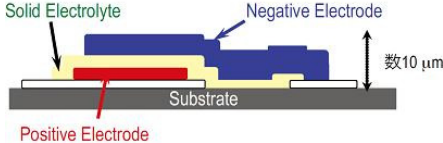
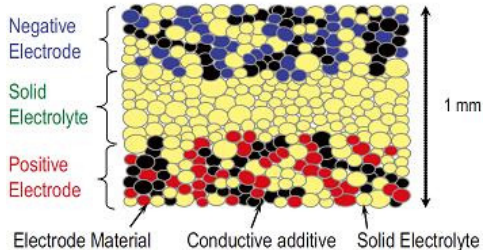
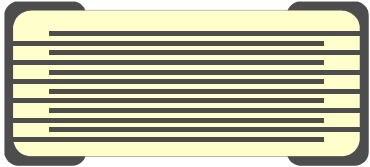
Safe



- Fit in tiny mobile devices
- Stand-alone power source
- Up to 1000 charging cycles
- Cost-efficient mass production
- Must not leak, burn or explode

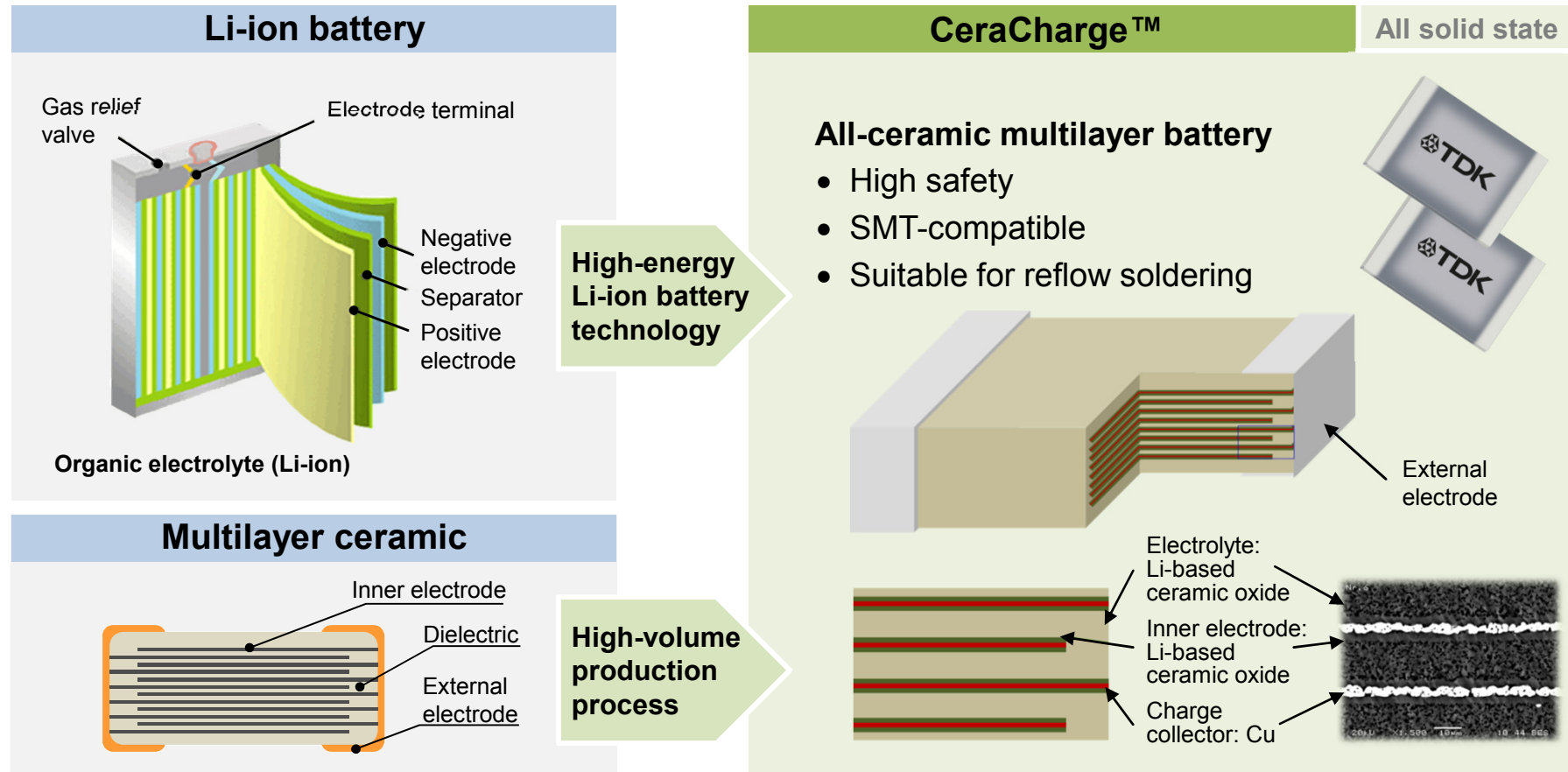
**Solid-state batteries are the only solution
able to meet all key requirements**

Comparison of solid-state battery technologies

	Thin-film	Bulk (pouch cell)	Ceramic multilayer
Structure			
Thickness	0.2 mm to ~1 mm	>1 mm	0.2 mm to ~3 mm
Smallest footprint	4 mm ²	>100 mm ²	0.5 mm ²
Process cost	High	Medium	Low
Limitations	Transport restrictions for Li metal (flights)	Must be waterproofed to prevent generation of H ₂ S	None

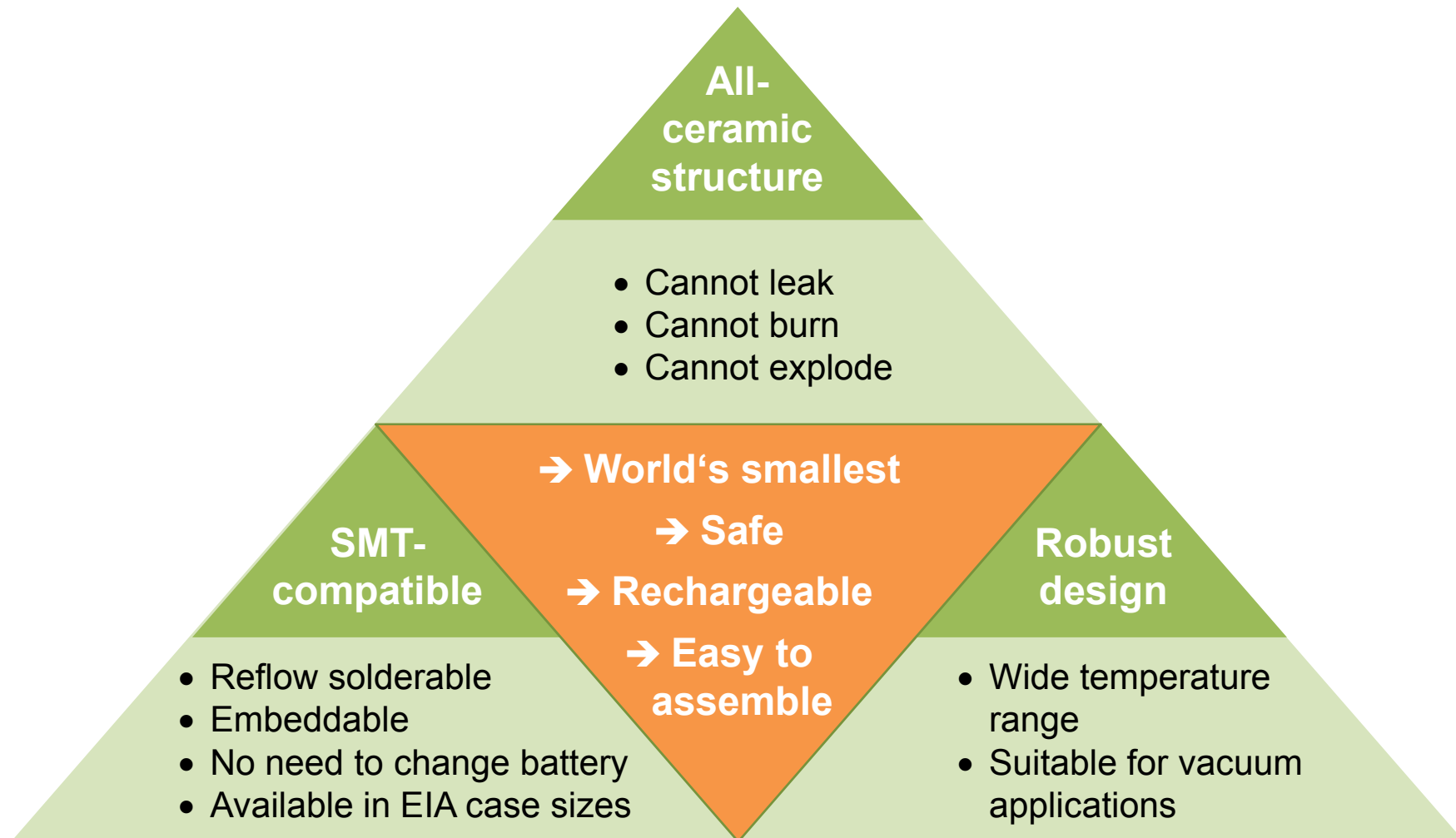
Ceramic multilayer technology offers the cost-optimized, high volume manufacture of safe batteries for IoT devices

Introducing CeraCharge™ – the world's first solid-state, SMT-compatible Li-ion battery



CeraCharge combines the advantages of Li-ion batteries with the safety and manufacturing benefits of ceramic multilayer components

Unique features of CeraCharge



CeraCharge – World's first rechargeable solid-state SMD battery

CeraCharge 1812

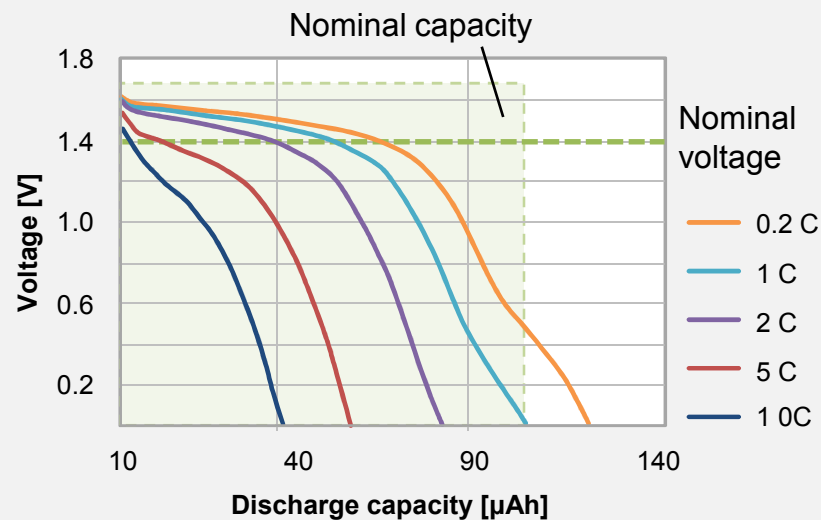
Nominal voltage	[V]	1.4
Operating voltage	[V _{op}]	0 to 1.6
Nominal capacity	[μAh]	100 ±20
Nominal discharge current	[μA]	20
Operating temperature	[°C]	-20 to +80
Case size	[EIA]	1812
Dimensions	[mm]	4.5 x 3.2 x 1.1
Initial inner resistance	[Ω]	<200
Weight	[g]	0.045



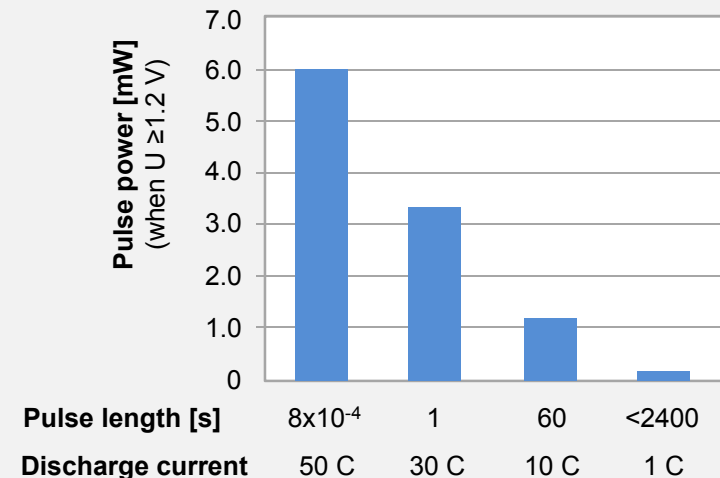
CeraCharge offers 1000 times the capacity of a capacitor in the same case size

CeraCharge features fast and pulsed discharging

Typical discharge curves

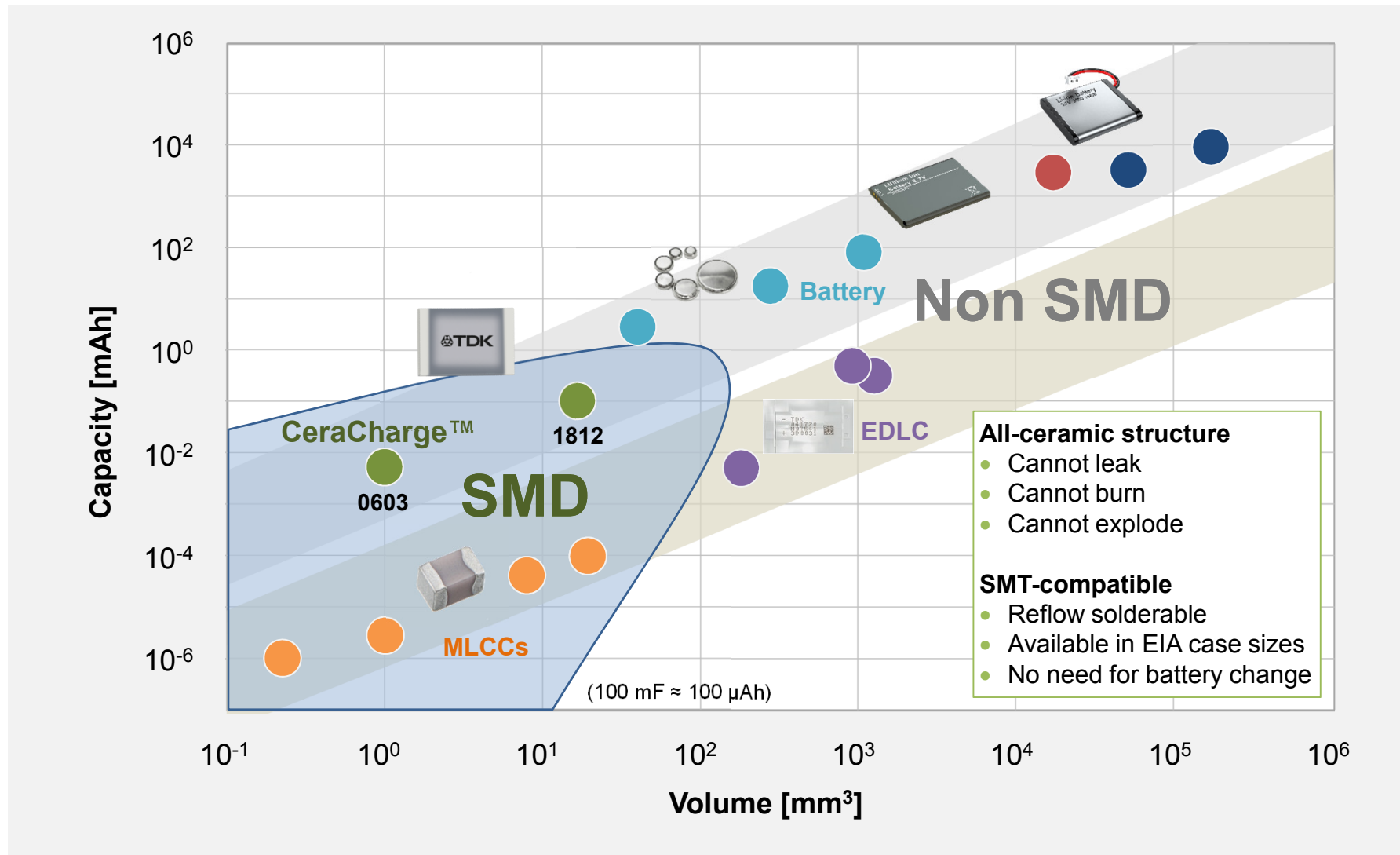


Typical pulse power



Can be connected in both series and parallel for maximum design flexibility

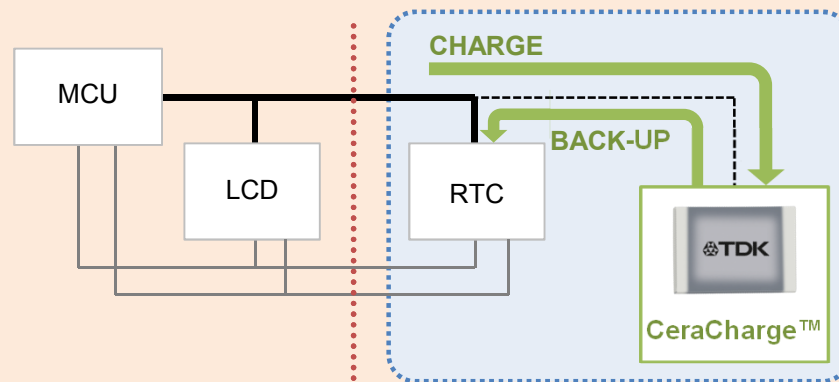
Comparison of energy storage devices



Main applications for CeraCharge

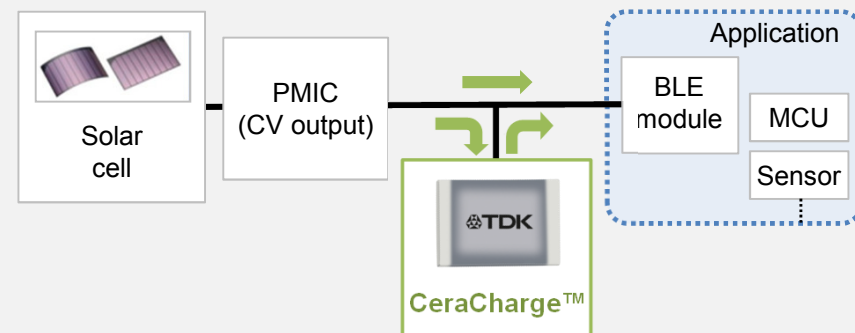
Real-time clock

Backup battery



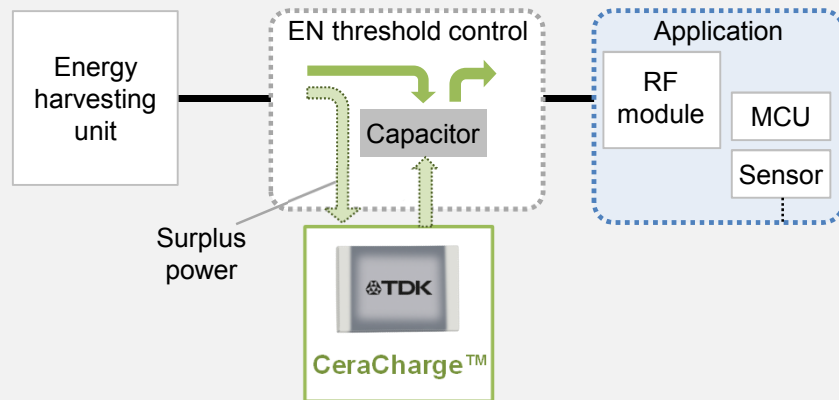
Internet of Things: Beacon

Energy storage (battery)



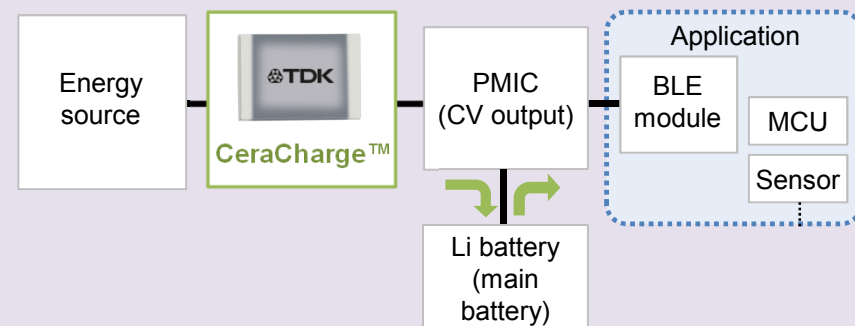
Energy harvesting

Energy storage



Wearables

Sub-battery for voltage and current smoothing



Outlook

First samples of CeraCharge 1812/100 μ Ah available

Mass production starting Summer 2018

0603 type in development





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